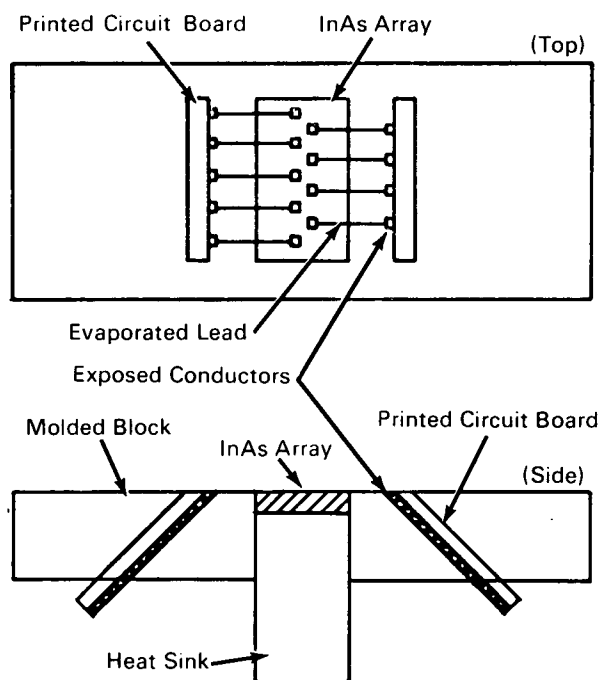


# NASA TECH BRIEF



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## Coplanar Interconnection Module



### The problem:

Operation of most infrared detector elements requires that the semiconductor be cooled well below room temperature, frequently to  $-196^{\circ}\text{C}$ . In the case of an array of elements, it is desirable to use a thin film interconnection from each semiconductor wafer to external conductors. Existing techniques for such interconnection have not provided an adequate heat sink for satisfactory operation.

### The solution:

A module, for interconnecting a semiconductor array to external leads or components, which incorporates a metal external heat sink for cooling the

array. This heat sink extends downward from the molded block that supports the array and is immersed in a liquid nitrogen bath which is properly sized and vented to maintain the desired array temperature.

### How it's done:

The semiconductor wafer (InAs array) is bonded directly to a metal heat sink by a thermally conductive material such as a solder or appropriate metal alloy (see fig.). Lead patterns are provided by printed circuit boards which allow external connections to be brought to a coplanar surface adjacent to the array. The printed circuit boards are placed at angles so that the cross section of the copper pattern is enlarged. The coplanar surface between the printed circuit leads and the array is formed by casting a thermosetting plastic around the heat sink and printed circuit boards, thus maintaining them in proper alignment. Interconnection from the array to the printed circuit boards is provided by evaporating thin film metal leads across the surface of the semiconductor and plastic to the exposed printed circuit leads.

### Notes:

1. This technique has been implemented for 50-element InAs arrays with satisfactory operation at  $-80^{\circ}\text{C}$ , the normal operating temperature of InAs devices.
2. The following documentation may be obtained from:

Clearinghouse for Federal Scientific  
and Technical Information  
Springfield, Virginia 22151  
Single document price \$3.00  
(or microfiche \$0.65)

Reference: NASA-CR-86039 (N68-19209),  
Solid State Image Sensor Research

(continued overleaf)

**Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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